

Claims

I claim:

1. A method for comparing features of a test record with features of a reference record, each feature having a location and orientation, comprising;

determining a weight for each feature of the reference record;

aligning the features of the test record with the features of the reference record;

measuring differences between the locations and orientations of the features of the reference record and the features of the test record; and

summing the weights of all features of the reference record that are less than a predetermined difference when compared with the features of the test record to determine a similarity score for the reference record.

2. The method of claim 1 further comprising:

comparing the features of the test record with a plurality of reference records to determine a plurality of similarity scores; and

selecting a particular reference record as a candidate reference record if the corresponding similarity score is greater than a maximum threshold.

3. The method of claim 1 further comprising:

extracting the features from images of fingerprints.

4. The method of claim 1 wherein the alignment is a rigid transformation including global translation and rotation.

5. The method of claim 1 wherein the alignment is a rigid transformation including only global translation to approximately align the features of the test record with the features of the reference record.

6. The method of claim 5 wherein a probability of matching features is represented by a zero-mean Gaussian function $f(0; \sigma^2)$, where σ^2 is a variance of the function.

7. The method of claim 1 further comprising:

measuring differences only between pairs of features that are approximately aligned.

8. The method of claim 1 wherein the determining step further comprises;

identifying, for each feature in the reference record, a local neighborhood of features; and

setting the weight of each feature proportional to a function of distances between each feature and the local neighborhood of features.

9. The method of claim 8 wherein the distance function for weight w_i and k

features in the local neighborhood is $N \frac{D(d_i^1, d_i^2, \dots, d_i^k)}{\sum_{j=1}^N D(d_j^1, d_j^2, \dots, d_j^k)}$.

where d_i^n is an n th distance of feature i .

10. The method of claim 8 wherein the distance function is an arithmetic mean.

11. The method of claim 8 wherein the distance function is a geometric mean.

12. The method of claim 8 wherein the distance function is maximum distance.

13. The method of claim 1 wherein the sum of the weights of the features of the reference record is normalized to one.

14. The method of claim 6 wherein the similarity score S for a test record T of M features and a reference record R of N features is determined by

$$S(T, F) = \frac{2}{(N + M)} \sum_{j=1}^M \sum_{i=1}^N w_i f(x_j - x_i; \sigma_x^2) f(y_j - y_i; \sigma_y^2) f_q(q_j - q_i; \sigma_q^2),$$

where x and y represent the location of the feature, q the orientation of the feature, w the weight of the feature, and f is a difference function.